

# Design and Analyze Networks


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# Cisco ONP network designs

A Cisco ONP network design is a network architecture planning approach that

- allows you to create a new design manually or import an existing design,
- supports integration with various sources and tools such as Excel sheets, live network import, Cisco Transport Planner, or other Cisco ONPA instances, and
- provides flexibility in how network models are created and managed.

You can design a network in one of these ways:

- Manual design: Create a network design using the design palette.

- Import design: Import a network design from an Excel sheet, live network import, Cisco Transport Planner, or another instance of Cisco ONP.

This dual approach enables network architects to choose the method that best fits their workflow, making Cisco ONPA adaptable to various project requirements and existing data sources.

# Manually design a network using Cisco ONP

***Table 1: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Multi-Layer Platform (MLP) Greenfield Design with NCS 4k-1k-2k | Cisco ONP Release 4.1 | This feature allows you to:<br>• Support NCS 4K-1K-2K multiplatforms<br>• Visualize new layout for Txp and SVO for NCS 2000 node<br>• Support different OTN service types with protection<br>• Edit layout for NCS 4000 and NCS 1004 nodes |

Use this procedure to create a network in the Cisco ONP.

You can create any of these network designs:

- Spectrum Switched Optical Network (SSON) that uses flexible spectrum allocation, where the required minimum spectral resources are allocated adaptively based on traffic demand and network conditions.
- Non-SSON network that allocates single spectrum (fixed spectrum) irrespective of the traffic demand and network conditions.

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Choose **File** > **New**.

**Step 2** In the **Create New Network** dialog box, choose the required options to create a network.

| Choose | To create... |
|---|---|
| NCS 2000 | a non-SSON network that contains NCS 2000 and NCS 4000 nodes, or an SSON network including NCS 2000, NCS 1004, and NCS 4000 nodes |
| NCS1010 | a network that contains only NCS 1010 nodes |

a) If you want to create an SSON network, check the **SSON Network** check box. Otherwise, do not check the check box..
b) Choose the **System Release** for NCS 2K from the drop-down list.

   You cannot change the system releases that are available for NCS 4K and NCS 1K.

c) Click **Create**.

   The application displays a map and the design palette. For details, refer to Design Palette.

**Step 3** Click the **Drawing Tool** icon (pencil and ruler crossed), and add sites and other network elements.

a) Add sites to the map using the drawing tool.

   Zoom in on the map to the desired level. Click any of the site icons (**ROADM**, **OLA**, or **Traffic**(4K-1K-2K)), and drag it to the sites on the map. Drag or click the map where a site has to be placed, when the cursor changes to the site icon.

   **Note**
   - SRLG is not supported in the SSON networks.
   - Cisco ONP calculates the distance based on the x and y coordinates on the map. Before you create the design, zoom in the map to the maximum for an accurate distance, because the distance is used to calculate signal degradation.

b) Click the **Fiber** icon and drag it to connect from one site to another site. Continue this for all sites.
c) Create services between the sites.

   Cisco ONP provides only OTN service.

d) Click **OTN Service** (green) and add the service between the existing Traffic sites on the map.
e) Click **Media channel** (purple), or **Waves** (red), and add media channel, or waves between the existing sites on the map.

   In the left pane, you can view a network tree panel with a default network name. The network elements added are displayed in the tree panel.

**Step 4** Choose **File** > **Save As**.

a) In the **Give a Network Name** dialog box, enter a network name and click **Save**.

# Create shared risk link group

Use this procedure to create Shared Risk Link Group (SRLG) using the Cisco ONP GUI. The SRLG feature enables routing of protected services.

**Note** SRLG is supported only for non-SSON networks that include traffic nodes.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network where you want to create the SRLGs.
**Step 2** Click the network tree panel.
**Step 3** Expand **Fibers**, and check the check box next to each fiber that should be in the same SRLG.
**Step 4** After selecting all fibers, right-click and choose **Create SRLG**.

Cisco ONP creates an SRLG with a unique name, which you can subsequently rename.

# Import a network using an Excel sheet

Use this procedure to import a network into Cisco ONP, using an Excel sheet.

Follow these steps to import a network into Cisco ONP, using an Excel sheet.

**Note** By default, the system release of the Excel-imported network is 11.0.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Choose **File** > **Download Import Template** to download the Excel sheet template.

The template has tabs and fields that you must fill in the Excel sheet. For details about these tabs and fields, refer to Tabs available in the Excel sheet template, on page 4.

**Step 2** Fill the network details in the template file or edit the current network file, and save the file.
**Step 3** Choose **Import** > **Excel** .
**Step 4** Browse for the file, select it, and click **Import**.

The selected network is imported.

If there are errors in the imported data, a pop-up error message is shown in case of new import, and the errors are available under the **Elements** > **Messages** tabs in case of updating the existing network.

## Tabs available in the Excel sheet template

This table lists the various tabs available in the Excel sheet template used to import a network.

*Table 2: Tabs available in the Excel sheet template*

| Tabs | Description |
|---|---|
| Network | Label (name of the network), Platform (NCS2000) |
| Sites | Site Label, Type, X coordinates, Y coordinates, Pre Equip Degree |

# Network imports from Cisco Transport Planner

The Cisco Transport Planner network import is a compatibility feature that

- allows you to import networks created and analyzed in Cisco Transport Planner into Cisco ONP, as `.mpz` files,
- prevents the need to recreate existing networks, and
- supports only networks from Release 11.0 or later for compatibility.

## Supported hardware for CTP network import

Cisco ONP supports these hardware as part of CTP network import.

- Optical source files and transponders

  See Supported Optical Sources, and Supported Cards and Pluggables.
- Contentionless, colorless, and colored point-to-point demands
- Flex network
- Gain Equalizer

**Note** The Gain Equalizer node converts to a ROADM node when you unlock the site after a release upgrade.

- ROADM-SMR-9 and SMR-20
- All flex supported amplifiers, controller cards, and chassis types

## Import an mpz design file from Cisco Transport Planner

Use this procedure to import an mpz file from Cisco Transport Planner to Cisco ONP.

**Before you begin**

- Log in to the Cisco ONP web interface as a user with network creation permission.
- Import the required optical source files and layout template using **Manage** > **Optical Source** and **Manage** > **Optical Source** options. For more information, refer to **Manage Alien**, and **Manage Layout** .

- Delete the unsupported parameters for Cisco ONP from the mpz file. For example, mpz networks with P-Ring and A2A demands are not supported for import. Delete these demands in Cisco Transport Planner, reanalyze the networks in Cisco Transport Planner, and import the mpz file into Cisco ONP.

The network must be in design-analyzed or upgrade-analyzed mode.

**Procedure**

**Step 1** Choose **Import** > **MPZ**.

The **Import File (mpz)** dialog box appears.

a) Browse to the mpz file stored on your computer.
b) Click **Import**.

The mpz file is imported to Cisco ONP.

**Note**
If you view a blank screen when you click waves in the network tree, refresh the browser.

**Step 2** Choose **Network** > **Upgrade** or **Network** > **Release Upgrade** to make any changes on the imported network.

**Note**
- You cannot go back to design mode on the imported mpz network.
- The wave label of imported mpz network in Cisco ONP is the service name present in the Cisco Transport Planner properties window.

# Export the CPZ file

Cisco ONP saves the network design file as a .cpz file in its database. Use this process to export the design file to your computer.

The contents of the .cpz file depend on the network mode:

- In design mode, the .cpz file includes the design file, layout template, and optical source details.
- In analyze mode, the .cpz file contains several items: a design file, analyze file, ANS file, per-side ANS file, BOM, error messages, trace files, layout template, mpz, and report.
- For networks in upgraded mode, you can only export the last child in the parent-child hierarchy.



**Note** You can export only one network at a time.

**Before you begin**

Log in to the Cisco ONP web interface

### Procedure

**Step 1** Open the network whose design file that you want to export.

The network opens.

**Note**
If a blank screen appears when you open a network, refresh the browser or log in to Cisco ONP again.

**Step 2** Choose **Export** > **CPZ**.

**Step 3** Inside the **Export .cpz file** dialog box:

a) Rename the file if necessary.

b) Click **Export**.

The design file is stored on your computer. Starting with Release 26.1.1, the LUT version utilized in the current network will be included during the export of the network CPZ file, ensuring that the specific LUT is loaded on any server during CPZ import.

# Import the CPZ file

Use this procedure to import the cpz network design files that are exported from another Cisco ONP instance.

**Note** You can import only the networks that are exported from the current release.

### Before you begin

Log in to the Cisco ONP web interface

### Procedure

**Step 1** Choose **Import** > **CPZ**.

**Step 2** In the **Import .cpz file** dialog box:

a) Click **Choose file**, and select a cpz network design file that you want to import into Cisco ONP, from your local system.

b) Click **Import**.

If the names of the optical source and layout template files in the database and the imported network file match, Cisco ONP prompts you to confirm whether you want to overwrite the existing file.

**Note**
The message **"Network already exists in the system with another user. New network will be created"**, you do not need to take any action. Cisco ONP automatically imports the network as a new network for you without changing the existing network.

c) If you want to overwrite the existing file, check the **Overwrite Network** check box.

If you do not check the box, Cisco ONP saves the imported network as a new network.

d) Choose the optical source files and layout template that you want to replace.

If you do not choose the optical source or the layout template file, the files will not be imported.

e) Click **Confirm**.

The imported network is saved in the Cisco ONP database.

**Step 3** After you successfully import the CPZ network:

a) Choose **Network** > **Entity Editor**.

a) Click the network name and select the required user profile from the **Profile** drop-down-list.

If you import a CPZ network that was exported from Release 26.1.1, the user profile associated with that network is included and remains active. If you import a CPZ network from earlier releases without an attached profile, you can apply a profile. The applied profile affects only entities added to the network after the import. Existing entities remain unchanged.

# Live Network Import

The Live Network Import (LNI) feature is a network import capability that

- enables real-time import of deployed networks into Cisco ONP,
- supports networks with NCS 1004, NCS 2000, and NCS 4000 nodes , and
- allows you to view comprehensive deployed network details after import.

***Table 3: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Live Network Import | Cisco ONP Release 4.1 | This feature allows you to import a live deployed network having NCS 1004, NCS 2000, and NCS 4000 nodes into Cisco ONP, using the LNI (Live Network Import) import template. This feature also allows you to view network topology, BOM, and layout report. |

The Map displays the network topology, and you can check the node, fiber, OTN service, and media channel properties through the Network Tree and the Entity Editor.

## Perform live network import

Use this procedure to perform live import of a network.

**Before you begin**

- Perform LNI only when the Cisco ONC is in a stable or running state. Do not perform LNI during the maintenance period for software upgrade.

- Configure all the mandatory parameters on the circuit.
- Make sure that the following Cisco IOS XR Software Maintenance Updates (SMUs) are loaded on the NCS 4000 devices on top of Cisco IOS XR Release 6.5.28:
  - ncs4k-6.5.28.CSCvu93045.tar
  - ncs4k-sysadmin-6.5.28.CSCvt67465.tar
  - ncs4k-6.5.28.CSCvv79518.tar
- Make sure that there is a provision for opening three TL1 sessions per NCS 2000 device for Live data collection. Avoid overloading NCS 2000 devices with TL1 sessions.
- Configure the fibers with the same channel numbers (Spectral Density, for example: 91.0/82.0) on both the source and destination ends.
- Check the card label set for these NCS 2000 cards and update it if they are not aligned.

| PID | Card label |
|---|---|
| NCS2K-16-AD-CCOFS | AD-16-FS |
| NCS2K-20-SMRFS | SMR20-FS-CV |
| NCS2K-20-SMRFS-L | SMR20-FS |
| NCS2K-9-SMR17FS | SMR9-17-FS |
| NCS2K-9-SMR24FS | SMR9-24-FS |
| NCS2K-9-SMR34FS | SMR9-34-FS |
| NCS2K-9-SMR34FS-L | SMR9-34-FS |
| 15454-M-RAMAN-COP= | OPT-RAMP-COP |
| 15454-M-RAMAN-CTP= | OPT-RAMP-CTP |
| NCS2K-OPT-EDFA-35 | OPT-EDFA-35 |

- To open the Cisco ONP application, install Microsoft Excel on the client machine where you launch the browser.
- Log in to the Cisco ONP web interface

.

### Procedure

**Step 1** Choose **Export** > **Download LNI Import Template**, and download the template which is in the form of an Excel sheet.

**Step 2** Fill the template with the details of all the nodes belonging to the network to be imported and save the file.

These fields are mandatory:

- Node IP

- User Name
- Password
- Connectivity Type—TL1 for NCS 2000 nodes and NETCONF for NCS 1004 and NCS 4000 nodes
- Connectivity port—830 for NCS 4000 and NCS 2000 nodes

**Note**
Enter a value in the range of 60 to 180 in the Connectivity Timeout field or leave the field empty.

**Step 3** Choose **Import** > **Live Import**.

a) Browse and choose the saved file.
b) If you want to clean the existing LNI database of the nodes and perform a fresh import, check the **Fresh Import (Cleanup LNI Database)** check box.

**Note**
We recommend performing a fresh import of the live network.

Leave this check box unchecked to import the details for only a few nodes that had issues during the previous import.

**Note**
LNI import is not user-specific. When you perform a fresh import, Cisco ONP overwrites all the LNI data that are imported by the other users.

c) Click **Import**.
d) In the **Device Onboarding** dialog box, click **OK**.

**Note**
If you try to import a network of unsupported version, the device collection does not happen,. An error message "device collection failed" appears. See Supported Hardware and Software for LNI, on page 13.

**Step 4** View the status of the LNI operation:

a) Click **Job Monitor**, and click **Check Progress** for the IMPORT_LIVE_NETWORK task, to view the status of the LNI operation in the **LNI Progress** dialog box. Click **Refresh** to see the updated status.

After LNI is completed, the job is removed from the **Job Monitor** page.

b) Click **Logs** to view the list of events that are related to the LNI operation, as logs.

**Step 5** After the completion of the LNI operation, choose **File** > **Open**.

The format of the LNI imported network filename is LNI_<Date>_<Time>.

**Step 6** Click the imported network name to view the network under the **Map** tab and its corresponding network tree in the left panel.

The aggregated node that includes NCS 1004, NCS 2000, and NCS 4000 appears in purple, and the aggregated node that includes NCS 1004 and NCS 2000 appears in orange in the network tree. You can view the tag **Imported from Network** in the interface.

**Note**
- Even if errors occur during the LNI operation, the operation is not canceled. In this case, when you open the imported network, a warning message appears.
- You can view the errors under the **Elements** > **Messages** tab.

- Device collection failure is listed under critical messages.
- The reason for failure is listed under noncritical messages.

- If both NCS and Non-NCS PIDS are present in the inventory, Cisco ONP enables the **Enable NCS** option. You can edit this option during upgrade after unlocking the site, if necessary.
- Service path for the restored circuits is displayed as:
  - Primary Path: Working path before restoration
  - Secondary path: Protected path
  - Restoration path: Current work path after restoration

**Note**
If the circuit is not in the restored state, the restoration path is not shown.

- SSON circuits carrying protected OTN services are merged as Client 1+1 protected Media Channel. Due to this, you may see difference in total number of SSON circuits between the imported network in Cisco ONP and the actual network.
- If LNI is not installed properly, you may encounter the errors such as LNI failure or LNI not able to purge the data. In such cases, we recommend starting and stopping the LNI services in the server where Cisco ONP and LNI are installed using these commands:
  - Stop the LNI services.

```
root:~/$ONP_HOME# cd LNI
root:~/$ONP_HOME/LNI# bash ciscolniinstaller.sh -o stop -t update -m offlinemode
```

  - Start the LNI services.

```
root:~/$ONP_HOME/LNI# bash ciscolniinstaller.sh -o start -t update -m offlinemode
```

**Note**
Wait at least 5 minutes after starting the services for LNI services to resume before triggering a new live network import.

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**What to do next**

Click the **BOM** tab to view the BOM details of the network.

**Note** The PIDs of prototype cards are shown as "NA" in the BOM details of the LNI network.

You can export the CPZ, import the CPZ, and share the imported network. Use the **Entity Editor** to view network properties.

## Ports used in LNI

LNI application uses the following ports. If any port is shut down due to any failure, then the service is restarted by the Docker system.

*Table 4: Ports used in LNI*

| Port | Service | Usage |
|---|---|---|
| 8761 | Eureka Service | Registration and discovery service, which holds the information about all microservice applications |
| 8088 | API Gateway | Receives all the incoming requests, and then delegates the requests to internal microservices like LNI Broker |
| 8086 | Collector Service | Collects metrics and operation data from the devices |
| 8082 | Device Manager | Responsible for device onboarding process |
| 8083 | Inventory Service | Provides inventory data |
| 9975 | TL1 plug-in Service | South bound interface plug-ins for TL1 protocol-based NCS 2000 devices |
| 8898 | NCS 2K Inventory Adapter Service | Adapter module to transform NCS 2000 device response from collector to Cisco ONP NCMS schema-based POJO |
| 8899 | NCS 4K Inventory Adapter Service | Adapter module to transform NCS 4000 device response from collector to Cisco ONP NCMS schema-based POJO |
| 8900 | NCS 1K Inventory Adapter Service | Adapter module to transform NCS 1004 device response from collector to Cisco ONP NCMS schema-based POJO |
| 9976 | NETCONF plug-in Service | South bound interface plug-ins for NETCONF based 1K/4K devices |
| 8898 | NCS 2K Inventory Adapter Service | Adapter module to transform NCS 2000 device response from collector to Cisco ONP NCMS schema-based POJO |
| 8899 | NCS 4K Inventory Adapter Service | Adapter module to transform NCS 4000 device response from collector to Cisco ONP NCMS schema-based POJO |

| Port | Service | Usage |
|---|---|---|
| 8900 | NCS 1K Inventory Adapter Service | Adapter module to transform NCS 1004 device response from collector to Cisco ONP NCMS schema-based POJO |
| 9976 | NETCONF plug-in Service | South bound interface plug-ins for NETCONF based 1K/4K devices |
| 8102 | LNI Broker Service | Provides interfaces for Cisco ONP BE service to trigger live network import |
| 8085 | Topology Service | Provides network topology data |
| 8090 | Circuit Service | Provides network circuit data |
| 8024 | NETCONF Adapter Service | Common adapter for Topology and Circuit servi<br>ces |
| 8091 | Model Aggregator Service | Aggregates inventory, topology, and circuit details under NCMS schema-based networks |
| 8092 | TL1 Adapter Service | Common adapter for Topology and Circuit Service |
| 5601 | Kibana | Data visualization and exploration tool that is used for log and time-series analytics, application monitoring, and operational intelligence use cases<br>**Note**<br>The default Edge browser on Windows OS is not supported for viewing the Kibana logs. Cisco recommends using Firefox or Chrome browser for viewing the Kibana logs. |

## Supported Hardware and Software for LNI

The following table describes the software versions and hardware requirements of the network imported through LNI.

*Table 5:*

| Property | Values |
|---|---|
| **Network** | |
| Network Type | SSON |
| Platform | ETSI |
| System Release | NCS 2000: R11.1, and R11.1.1.2<br>NCS 1004: XR 7.0.1<br>NCS 4000: XR 6.5.2.8 |
| **Site/Node** | |
| Site Type | 4K-1K-2K: ADD/DROP, 1K-2K;Regen, 2K:ROADM/OLA |
| ROADM | SMR-20, SMR-9-17FS, SMR-9-34FS, SMR-9-24FS |
| Amplifier | RAMAN-CTP, RAMAN-COP, EDFA35-24, EDFA35-35 |
| Degree Mesh Type | DEG-5/UPG-4 |
| Chassis Type | 4K: NCS4016, 2K:NCS2006, 1K:NCS1004 |
| Power Supply | 4K-DC, 1K-DC, 2K-DC40 |
| ECU | ECU-S |
| Controller Card | TNCS-2, TNCS-2O |
| Channel Rule | 82 |
| Line Cards | NCS1K4-1.2T-K9=, NCS4K-4H-OPW-QC2 |
| Evolved Mesh | ON and OFF |
| Node Protection | 2K: Separated shelves, 4K: Single shelf |
| Mpo16Lc | MPO-16LC Unit |
| Mpo16ToMpo08 | MPO16TO2MPO8Cable |
| Cascaded SMR | Yes |
| Enable NCS | Yes |
| Use Payg | No |
| Connection Verification | Yes, No |
| MF Unit | MF-6RU, MF6-10RU, or MF-1RU |

| Property | Values |
|---|---|
| Structure | Line, Multidegree, Terminal |
| Scalable upto degree | 4, 8, 12 |
| Power redundancy | Yes |
| IP Address | IPv4 |
| **Fiber** | |
| OSC Frame Type | Auto |
| DCN Extension | Yes |
| ENE/GNE | Yes |
| Length | Yes |
| Loss | Yes |
| Measurement Unit | KM |
| Length based Loss | No |
| Raman Amplified | Yes |
| Fiber Type | G652-SMF-28E |
| Connector Loss A | Yes |
| Connector Loss B | Yes |
| Cross OSC and Parallel OSC | Yes |
| **Media Channel** | |
| Traffic Type | NCS1004_SP_16QAM_16QAM_300G_27%SDFEC_60GBd |
| Protection | Unprotected, and 1+R |
| Path | Actual Path |
| Regen | Regen site |
| Multicarrier | No |
| Contentionless | Yes |
| Circuit State | Restored, Unrestored |
| **Service** | |
| Service Type | 100GE, 10GE, STM-64 |
| Protection | 1+1, Unprotected, 1+R, 1+1+R, 1+1+R+R |

| Property | Values |
|---|---|
| Path | Actual Path |
| Client Type (1K) | OTU4 |
| Interface Type (1K) | BH |
| Trunk Mode (1K) | 200G, 300G |
| Baud Rate (1K) | 60 and 69 GBd |
| Client Pluggable | ONS-QSFP28-LR4=, QSFP-100G-SR4-S=,ONS-QSFP-4X10-MLR= |

## Limitations of LNI

These are the limitations, unsupported features, and known constraints of LNI, and scenarios where LNI may not function as expected and the available workarounds.

- Simultaneous import of multiple live networks and scheduled import are not supported. LNI does not support importing Non-SSON networks, Non-Contentionless configurations, circuits with NCS 2000 Transponder or Muxponder cards, or NCS1001, NCS1004, and NCS4000 devices.
- The chassis position in the layout may not be accurate in the live imported network. NCS 2000, NCS 1004, and NCS 4000 chassis are placed in separate racks to provide a clearer layout view.

  **Workaround**: You can edit the layout after network upgrade and analysis.
- If X, Y coordinates are not configured in the devices, nodes are overlapped in the Cisco ONP map.

  **Workaround**: Configure X, Y coordinates before importing the network for a better view of the topology in Cisco ONP map; otherwise, you can drag and drop the nodes in the Cisco ONP map and adjust the node position after importing.
- The Scalable upto degree parameter is not imported from the real device. Cisco ONP chooses the maximum scalable up to degree based on the number of line sides and contentionless sides present on the node.

  **Workaround**: Unlock the node after upgrading and change the scalable upto degree. After unlocking the site, use the layout template to rearrange the layout.
- Cisco ONP imports the proto-PID, if present in the inventory, and show as N/A PID in the Cisco ONP BOM. Duplicate media channel labels are not supported. If multiple media channels with the same label exist in the network, only one is imported; the rest are discarded.
- Fiber name, source, and destination names may not match between imports; source and destination site names may interchange for bidirectional fibers. Fibers may not associate with the correct optical subnet if channel numbers differ at source and destination, causing amplifier output power issues. Workaround: Correct channel numbers at both ends and re-import or associate fibers with the correct optical subnet after upgrade.
- If the regenerated demand is in restored state, the restored path is shown as working or protected path, and service protection is shown as 1+R in Cisco ONP. Restoration details will not be available. Service protection type is shown as 1+1+R or 1+1+R+R only if restoration path is available. Otherwise, it is shown as 1+1.

Preprovisioned cards are not listed in the Cisco ONP BOM and are populated only after a successful upgrade and analysis of the LNI network. Ensure that the cards are equipped to retrieve the PID details.

# Optical subnets and their role in networks

An optical subnet is a network structure that

- consists of a collection of spans with defined properties,
- is automatically created when a new network is set up in Cisco ONP, and
- must exist in at least one instance for every network.

When a new network is created, Cisco ONP links an optical subnet to it, ensuring that each network has its own optical subnet for proper operation.

# Create optical subnet

Use this procedure to create an optical subnet in Cisco ONP for Non-SSON and SSON networks.



**Note** Check the **Current Subnet** check box in the properties window below the network tree, to make the subnet you created as the current subnet. You cannot uncheck the **Current Subnet** check box.

**Before you begin**

Log in to the Cisco ONP web interface

**Procedure**

**Step 1** Open the required network (Non-SSON or SSON) in which you want to create a subnet.

**Step 2** Expand **Subnet** in the network tree panel.

**Step 3** Right-click **Optical Subnet**, and select **Create Optical Subnet**.

**Step 4** In the **Create Optical Subnet** dialog box:

| If you are creating optical subnet for... | Then... |
|---|---|
| non-SSON network | From the **Cband Rules** drop-down list, choose the C-band design rules for the new optical subnet, then click **Save**. |

| If you are creating optical subnet for... | Then... |
|---|---|
| SSON network | • From the **Band Type** drop-down list, choose either **C-Band** or **L-Band**.<br>• From the **Spectral Density** drop-down list, choose the spectral density for the new optical subnet that you want to create.<br>The selected spectral density determines the value of **Name**, **CBand Rules** or **LBand Rules**, and **Maximum Number of Channels** that appear in the **Create Optical Subnet** dialog box.<br>• Click **Save**. |

**Step 5** (Optional) After the new optical subnet is created:

| If you want to... | Then... |
|---|---|
| select a new spectral density | select a new spectral density from the **Spectral Density** drop-down list in the properties window displayed under the network tree. |
| add a fiber to a subnet | add a fiber to a subnet from the **Fiber links** drop-down list in the properties window.<br>The fiber now appears in the **Fiber links** field. When you select the optical subnet, its corresponding fiber is highlighted in the map. |
| add a fiber to a subnet from the network tree panel | • Right-click the required optical subnet and select **Edit Fibers**.<br>• In the **Info** dialog box, click **OK**.<br>The user interface will freeze to allow fiber selection from the map.<br>• Select the required fiber and click the **Done** button appearing near the zoom icon.<br>**Note**<br>When a fiber is added to one of the subnets, it is automatically removed from the other subnets. Only one subnet rule is associated with each fiber. |

Cisco ONP creates the new optical subnet with your selected properties and places it under **OpticalSubnet** in the network tree panel.

# Share a network

Use this procedure to share a network with one or more users or user groups.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network that you want to share.

**Step 2** Choose **File** > **Share**.

**Step 3** In the **Share Network** dialog box, select one or more users or user groups, and then click **Share**.

You can share the network with selected users or user groups in read-only mode.

# Access a shared network

Use this procedure to open a network shared by another user and save an editable copy for your own work.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open a shared network.

a) Choose **File** > **Open Shared**.

b) In the shared network list, choose the network you want to open.
The shared network opens in read-only mode.

**Step 2** Choose **File > Save As**.

**Step 3** Enter a name for your copy and click **Save**.

A copy of the shared network is saved.

You now have your own editable copy of the shared network. You can work on it according to the privileges of your user role.

**Step 4** (Optional) If you want, share your updated network with other users.

# Unshare a network

Use this procedure to remove user or user group access to a previously shared network, ensuring only authorized individuals retain visibility and control of the network.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network you want to unshare.

**Step 2** Choose > **Share**.

**Step 3** In the **Share Network** dialog box, remove the name of one or more users or user groups from the list, then click **Share**.

The shared network is no longer available to the users or user groups that are removed.

# Analyze the network

After completing the network design, use this procedure to analyze the network.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network that you want to analyze.

**Step 2** Analyze the network:

a) Choose **Network** > **Analyze**.

The analysis progress indicator shows the current analysis status. After successful analysis, the network goes to **Analyze Mode**.

b) If you see the "Analysis Failed." message, navigate to the **Elements** > **Messages** tab to see the list of error details in the analyzed network.

By default, the system displays only the key messages when the **Critical Only** toggle button is enabled. If you want to view the entire network message, disable the **Critical Only** toggle button.

c) Resolve the error and analyze the network again. Continue until you resolve all errors.

**Note**
You may see the error message 'Unexpected Situation 999' if incorrect property values are entered or changed during network design. Contact Cisco TAC to identify the exact cause of the error. Afterwards, modify the suggested property value so that the network analysis completes successfully.

# Bottom-up flow and network creation

A bottom-up flow is a network creation approach that

- enables incremental, step-by-step building of a network over several days,
- allows analysis and report generation at each phase without requiring all services or waves to be configured on the first day, and
- provides flexibility in the order of adding network elements such as services and waves.

## How bottom-up flows work

### Summary

The bottom-up flow process enables gradual, phase-based network creation and analysis, giving users flexibility in building and evaluating their network incrementally.

The key components involved in the process are:

- Network administrator: Builds and configures the network in stages.
- Network topology: Consists of sites and fibers initially added to form the network's structure.
- Services and waves: Additional network components that can be added over time for increased functionality and connectivity.

### Workflow

The process involves the following stages:

1. On Day 0, the administrator creates the network by adding all sites and fibers to define the topology. They can analyze the network and view reports at this stage without configuring services or waves.
2. On Day 1, the administrator adds waves between sites (including both previously added and new sites/fibers), then re-analyzes and reviews updated reports.
3. On Day 2, the administrator adds services and tags the waves created in the previous stage, as well as incorporates additional sites and fibers as needed, with ongoing analysis and reporting.
4. After the initial topology is created, services or waves can be added in any order, without following a prescribed sequence.

### Result

The bottom-up flow process supports flexible, staged network development and ongoing analysis, optimizing the configuration and deployment of Non-SSON networks.

# Idle timeout in the Analyze mode

An idle timeout in analyze mode is a session management feature that

- logs users out of Cisco ONP if the browser is inactive for a default duration of 15 minutes,
- allows system administrators to disable or adjust the timeout through server configuration options, and
- affects ongoing network analysis by running it in the background if logout occurs during an active analysis cycle.

## Idle timeout settings and session restoration behavior

The default idle timeout in Cisco ONP is 15 minutes. System administrators can disable this timeout by setting the enabled option to false in the configuration file, or adjust the timeout duration by editing the duration option.

If a session times out during an analysis, network analysis continues to run in the background. When the user logs in again:

- If the analysis is ongoing, the progress bar appears and no actions are allowed.
- If the analysis is complete, the network opens in Analyze mode.
- If the analysis failed, the network opens in Design mode and the failure reason can be viewed under **Elements** > **Messages**.

# Upgrade the analyzed network

Use this procedure to upgrade an existing network that is in analyzed mode. You can change specific properties of a network element while keeping the network layout and design locked.

Upgrade is supported for both SSON and for non-SSON networks.

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Open the network that you want to upgrade.

**Step 2** Upgrade the network:

a) Choose **Network** > **Upgrade**.

b) Click **Yes** .

The message “Network Upgraded Successfully” appears. The network goes into upgrade mode and network elements such as sites, fiber, waves (for non-SSON), and media channel (for SSON) are locked.

**Step 3** To modify a network element in the network tree panel, right-click it, and click **Unlock**.

Unlock individual elements at the node, side, add/drop card, or amplifier level in the network tree hierarchy.

Make these modifications:

- Edit properties of network elements.
- Delete elements from the network.
- Add a new site, wave, service, demand, optical subnet, or fiber into the network map.

**Step 4** Choose **File** > **Save**.

The newly added elements are automatically displayed in the network tree panel, and by default, remain unlocked.

**Note**
To insert a node in upgrade mode, unlock the fibers connected to that node, then add the node to the network.

**Step 5** Choose **Network** > **Analyze**.

After the analysis is completed, the newly added elements are locked, and the optical reports and installation parameters of the upgraded network are updated.

When you add services or fibers while upgrading a network with an applied layout template, the template updates to include the new service or fiber. You can export the template, make changes, and reapply it to another network.

**Step 6** Choose **Network** > **Design** to further upgrade the newly upgraded network design.

Each time you upgrade the network, Cisco ONP saves the new version as a child network and maintains the parent-child relationship.

# Upgrade LNI network

Use this procedure to correct errors in your LNI network, modify ,and reanalyze it, and view updated BOM, layout, connections, and optical results.

***Table 6: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Upgrade LNI Network | Cisco ONP Release 4.1 | This feature allows you to upgrade and modify the imported LNI (Live Network Import) network as required. You can also correct LNI errors, reanalyze the network, and view the updated parameters such as BOM, layout, connections, and optical results. |

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network imported through LNI that you want to upgrade.

**Step 2** Upgrade the network:

a) Choose **Network** > **Upgrade**.

b) Click **Yes** .

The message “Network Upgraded Successfully” appears. After you upgrade the network, it enters upgrade mode, which locks elements such as sites, fiber, OTN services, and media channels.

**Step 3** To modify a network element in the network tree panel, right-click it, and click **Unlock**.

Unlock individual elements at the node, side, add/drop card, or amplifier level in the network tree hierarchy.

Make these modifications:

- Edit the properties of network elements.
- Delete elements from the network.

- Add a new site, wave, service, demand, optical subnet, or fiber into the network map.

**Step 4** Choose **File** > **Save**.

Each time that you upgrade the network, Cisco ONP saves the new version as a child network and maintains the parent-child relationship.

**Step 5** Choose **Network** > **Analyze**.

Analysis succeeds only if the imported network is consistent and valid. If the analysis fails, perform the listed steps:

a) Check the reports under **Elements Messages** for failure reasons.
b) Resolve the issues by modifying the network manually in Cisco ONP or re-importing the network after correcting the errors.
c) Reanalyze the network.

**Step 6** After analyzing the network:

a) Click the **Layout** tab and edit the layout manually to adjust chassis or card position for NCS 4000 and NCS 1004 platforms. See
b) Click the **BOM** tab and the **Results** tab to view the BOM and optical results.

# Media channel unlocking scenarios

This table explains the various media channel conditions and the unlocking possibilities.

***Table 7: Media channel unlocking scenarios***

| Conditions | Unlocking possibilities |
|---|---|
| The channel has OTN services. In 4K-2K cases, the service maps directly to the channel. In 4K-1K-2K, the service maps to the channel through the OTU4 trail. | Cisco ONP throws an error indicating that there are OTN services associated with the media channel. First, unlock the associated OTN services. Then, unlock and delete the media channel. You cannot update or delete the channel before unlocking the associated services. |
| Channel does not have OTN services going over it. For example, in the case of 4K-1K-2K, the media channel carries empty OTU4s. | Cisco ONP allows you to unlock the channel.When you unlock the channel, the properties of the channel and its child entities like Trail and Section are not cleared automatically, whether you or the system assigned them. You can only unlock the channel automatically if there are no associated OTU4s.<br><br>After unlocking the channel, you can delete the channel. You cannot update the properties of the channel or its child entities. When the properties of the media channel or any of its child entities are auto-assigned, the system clears and sets only the wavelength to Auto. All other properties are not cleared. |

| Conditions | Unlocking possibilities |
|---|---|
| Channel has neither OTN services nor OTU4(s) going over it. In case of 4K-1K-2K networks, Media Channel does not carry even empty OTUs. | Cisco ONP allows you to unlock the channel and automatically clears auto-assigned properties. After unlocking you can perform these:<br>• Update various properties of the channel and its child entities.<br>• Delete the channel. |

# Possible error scenarios and the workarounds

This table provides the workarounds for the errors that are shown under the **Elements** > **Messages** tab.

***Table 8: Error scenarios and the workarounds***

| Error message | Workarounds |
|---|---|
| Device Authentication failure | Check the username and password of the device provided in the LNI input Excel file. Retry the LNI import using valid device credentials. |
| Device collection failed or Device not reachable. | Check for any connectivity issues in the setup. Fix any identified issues and retry the LNI import. |
| In Site4.A, output power setting is not supported by the amplifier. | Unlock C-Band amplifiers for side A within Site4 in the Network tree, and set the correct output power. If you are unsure, choose Auto and analyze the result. Cisco ONP chooses the best value based on the configuration. |
| Cannot Route demand! Did not find any valid Omnidirectional Side. | For protected OTN or SSON services, ensure that at least two contentionless sides are present on both the source and destination sites. Add contentionless sides where necessary, then analyze the network configuration. |
| • Demand OTU3 has unrecognized type [OTU3]<br>• ServiceGroup does not support the demandType OTU3 for OTU3 | Only 100GE, 10GE, and STM-64 service rates are supported. If a different service rate exists in the network, unlock the specific service, change it to a supported service type, update the ODU time slot accordingly, and analyze the changes. |
| Primary OTN Demand [100GE_Flex] has invalid Timeslot ranges. Allowed ranges are [1-80] | 100GE service type must have ODU time slot in the range of 1–80. If any other value is set, update the correct value or leave it blank so that Cisco ONP can set it to the correct value. |
| Cannot complete mesh connections at Site3. | Unlock the site and reanalyze. |

| Error message | Workarounds |
|---|---|
| No OTN demand found for NCS4K trunk port - NCS4016-B - OTU40/8/0/1. | No action required. This is an information message to the user. |
| Fiber between Node1.A and Node2.B has an invalid value in connector loss value | Unlock the corresponding fiber couple and update the connector loss value so that it is greater than zero. The typical value is 0.2. |
| Fiber between Nod1.C and Node2.C has an invalid value in Tot SOL Loss w/o Connectors. | Unlock the corresponding fiber couple and update the Tot SOL Loss w/o Connectors value so that it is greater than zero. |
| Span Fiber-2 is forced as Raman but no traffic is present. | Remove Raman forcing on the fiber, or force the path for a service to ensure it travels through a Raman-enabled span. |
| Couple Fiber-2 has Raman enabled on the duct but corresponding Raman Forcing is missing. | Force RAMAN-CTP or COP on the Fiber-2 connecting node interface, or remove RAMAN forcing on the Fiber-2. |

**Note** No specific action is required for noncritical messages. These are just information messages to the user.

# Upgrade the software release of a network

*Table 9: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Release Upgrade | Cisco ONP Release 4.1 | This feature allows you to choose the NCS 2000 system release to the desired release (11.1.0, 12.0.1, or 12.1.0), while performing the release upgrade of CTP network, Cisco ONP network, network imported through Excel, and LNI network. |

You can upgrade the software version of networks that are imported from CTP, created in Cisco ONP, LNI Network, or imported from Excel to any desired release version. The release upgrade is supported for both SSON and non-SSON networks that have NCS 2000 nodes with ROADM, OLA, Traffic, or Passthrough functionality.

Release upgrade is supported starting with NCS 2000 Release 11.1.0.

**Note** NCS 2000 supports SVO from the Release 12.1.0.

See Supported upgrade paths for network system releases, on page 27for the available upgrade releases for each network type.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network in which you want to perform the system release upgrade.

**Step 2** Upgrade the software release of the network:

a) Choose **Network** > **Release Upgrade**.
b) From the NCS 2K drop-down list, choose the system release of NCS 2000, to which you want to upgrade.
c) Click **Submit**.

The upgraded network is saved as a child network.

**Note** If the PMD coefficient does not get updated with the expected value, update the fiber type first, followed by the PMD value when you edit the fiber properties.

**What to do next**

Unlock and modify network elements as needed.

# Supported upgrade paths for network system releases

This table shows the available upgrade releases for each network type.

***Table 10: Supported upgrade paths for network system releases***

| Network | Upgrade Release |
|---|---|
| CTP network (.mpz) | • From 11.0.0 to 11.1.0, 12.1.0, and 12.2.0<br>• From 11.1.0 to 12.1.0., and 12.2.0 |
| Cisco ONP network | • From 11.0.0 to 11.1.0, 12.1.0, and 12.2.0<br>• From 11.1.0 to 12.1.0., and 12.2.0<br>• From 12.1.0 to 12.2.0 |
| Excel imported network | From 11.0.0 to 11.1.0, 12.1.0, and 12.2.0 |

| Network | Upgrade Release |
|---|---|
| LNI network | 11.1.0 to 12.0.1 and 12.1.0<br>11.1.0 to 12.1.0 and 12.2.0<br>**Note**<br>You cannot directly release upgrade an LNI network. Perform the following:<br>• #unique_72.<br>• #unique_73.<br>• Release upgrade the analyzed LNI network. |

# Plan mode

Plan mode is a feature that

- enables what-if analysis on existing network designs,
- simulates network behavior under failure scenarios, and
- determines the ability to reroute services without providing guidance for expanding network infrastructure.

***Table 11: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| What-if Analysis for OTN Services | Cisco ONP Release 4.1 | This feature extends the current implementation of What-if analysis for the OTN Services that are connecting the aggregated nodes. The failure report includes the number of failed services, restored services, and unrestored services. This feature is supported forsworn (4K-1K-2K and 1K-2K) and non-SSON (4K-2K) networks. |

### Advantages of plan mode

The advantages of the plan mode are:

- Simulates and analyzes potential network issues and solutions,
- focuses on rerouting capabilities, and
- avoids requiring physical changes to network infrastructure.

### Supported network elements

Supported network elements in plan mode include:

- An NCS 2000 aggregated node that includes ROADM, OLA, and passthrough nodes
- Traffic nodes including1K-2K, 4K-2K, and 4K-1K-2K
- Nodes created in Cisco ONP
- Networks imported from Cisco Transport Planner in mpz format
- Networks imported from LNI

### Limitations of plan mode

Plan mode has these limitations:

- Only users with PLANNER and ADMIN roles can access the Plan mode.
- Plan mode does not guide you in turning up new wavelengths or adding new network components.

Use this procedure to evaluate potential network failures and review restoration outcomes by simulating fiber and site outages in Plan mode.

**Before you begin**

Log in to the Cisco ONP web interface as a user with admin or planner role.

Follow these steps to perform a what-if analysis in Plan mode

### Procedure

**Step 1** Open the analyzed network.

**Step 2** Choose **Network** > **Enter Plan Mode**.

The network switches to Plan mode. In this mode, you can perform what-if analysis by failing fibers and sites.

**Step 3** Fail ne or more sites:

a) In the network tree, expand **Sites**.
b) Right-click the site, and select **Fail**. Alternatively, right-click a site on the map and select **Fail**.
c) To fail multiple sites, select them and choose **Fail**.

**Step 4** Fail one or more fibers:

a) In the network tree, expand **Fibers**.
b) Right-click the fiber, and click **Fail**. Alternatively, right-click a fiber in the map and select **Fail**.
c) To fail multiple fibers, select them and choose **Fail**.

When a fiber fails, all media channels or waves, OTN services, and demands that pass through the failed fiber also fail. Symbols on the map indicate these failures:

- Failed channels: Red cross
- Fibers impacted due to site failure: Yellow cross
- Restored channels: Green check

d) To undo the fiber failure, right-click the fiber, and click **Undo Fail**.

**Step 5** (Optional) Create a failure set if you wish to group selected failures. SeeCreate a failure set.

**Step 6** After testing, restore the failed fibers by choosing **Restore**.

The restored channels are indicated by a green check mark in the network tree and map.

All media channels or waves, and demands that pass through the restored fiber are also restored. The Path Computation Element (PCE) restores OTN services based on optical feasibility and OTN constraints.

**Step 7** Export the failure report:

a) Choose **Export** > **Failure Report** to export the failure report as an Excel file. The failure report includes the parameters described in Failure report , on page 31.

b) Alternatively, click **Export** in the **Failure Report** area under the map.

Review unrestored channels and reasons for restoration failure in the **Elements** > **Messages** tab.

**Step 8** Exit Plan mode:

a) Choose **Network** > **Exit Plan Mode**.

---

The what-if analysis and failure report are completed and exported, providing insight into service impact and recovery.

# Create a failure set

Use this procedure to create and manage failed fibers and sites as a failure set within a failure group. You can simulate or track network outages efficiently in a single action.

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

---

**Step 1** Open a network and enter the Plan mode.

**Step 2** Right-click the **Failure Groups** option in the network tree panel.

**Step 3** Click **Add Failure Group**.

A failure group gets created.

**Step 4** Add fibers and sites to the group.

a) Choose the **Fibers** and **Sites** to fail by selecting the check boxes next to them.

b) Right-click the chosen **Fibers** and **Sites**, and click **Fail**.

**Step 5** Right-click to the network name and click **Add Failure Set**.

**Step 6** Select the failure group to which the failed fibers or sites must be added.

The system creates the failure set under the failure group and adds the failed fibers or sites to it.

**Note**

If a network has dark fibers that do not carry traffic, the system does not consider those paths for restoration.

# Failure report

This table describes the various parameters of the failure report.

***Table 12: Failure report***

| Report | Description |
|---|---|
| **Failed Fibers** | Shows the failed fibers in the network. |
| **Failed Sites** | Shows the failed sites in the network. |
| **Impacted Fibers** | Shows the fibers that are impacted due to the site failure. |
| **Total Channels** | Shows the total number of media channels in the network. |
| **Failed Channels** | Shows the total number of media channels that are passing through the failed ducts or sites in the network. |
| **Restored Channels** | Shows the total number of media channels that are restored from the failure state. |
| **Unrestored Channels** | Shows the total number of media channels that are not restored from the failure state due to the unavailability of alternate paths. |
| **Fiber HotZones** | Shows the fibers that have utilized greater than or equal to 80% of the bandwidth. You can modify the threshold by updating the value in the Feature.Properties file.<br>• **Fiber**: Shows the fibers that are listed under fiber hot zones.<br>• **Utilization Before (%)**: Shows the percentage of bandwidth that is utilized before the channel restoration.<br>• **Utilization After (%)**: Shows the percentage of bandwidth that is utilized after the channel restoration. |
| **Total Services** | Shows the total number of services going through the fiber that was failed. |
| **Failed Services** | Shows the number of failed services going through the fiber that was failed. |
| **Restored Services** | Shows the number of restored services going through the fiber that was restored. |
| **Unrestored Services** | Shows the number of unrestored services going through the fiber that was restored. |

# Import optical sources

Use this procedure to import an optical source

An Optical source wavelength is a way to connect a DWDM interface from any external element to a third-party optical network.

.

**Before you begin**

Log in to the Cisco ONP web interface.

Create an optical source from an Excel template

**Procedure**

**Step 1** Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears.

The default optical sources available in the server include:

- OpticalSources_NCS2K_400GXP-LC_NCS4K-4H-OPW-QC2
- NCS1004_OpticalSources_V3
- ONS-CFP2D-400G-C-OpticalSources-V2.mxd
- QDD-400G-ZRP-S-OpticalSources-V2.mxd

**Note**
By default, all existing optical source files are loaded in the server.

**Step 2** Click **Add**.

The **Import Optical Source (.mxd)** dialog box appears.

**Step 3** Click **Choose File**, browse to the .mxd file stored on your local system, and click **Import**.

After the optical source is imported, a list of related interfaces appears.

**Step 4** Select the check box next to each interface you want to import.

After you import the optical sources and their interfaces, they appear in the Type drop-down list in the properties window of the network tree. Use these interfaces when you create waves in your network design.

**What to do next**

Go to Download optical sources, on page 32 to download the optical source for Cisco ONC.

# Download optical sources

Use this procedure to download an optical source.

**Procedure**

**Step 1** Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears.

**Step 2** Select one or more optical sources to download.

The selected optical source data is downloaded in the chosen format.

# Delete optical sources

Use this procedure to permanently remove unwanted optical sources from Cisco ONP.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Choose **Manage** > **Optical Source**.

The **Manage Optical Source** dialog box appears.

**Step 2** Choose one or more optical sources to delete.

**Step 3** Click **Delete**.

Cisco ONP permanently removes the selected optical sources or aliens.

# Layout template

A layout template is a reusable configuration model that

- enables the design of consistent layout configurations for a network,
- applies fixed layout rules to multiple nodes, and
- saves time, reduces effort, and minimizes configuration errors.

Layout templates are especially useful when deploying NCS 2000 networks that require identical configuration across several nodes. Defining the layout once allows network engineers to ensure uniformity and compliance with network design standards during deployment.



**Note** Layout templates do not support configurations where there is a mix of TXP and Real card labels for transponders.

# Export layout template

*Table 13: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Layout Template Enhancement | Cisco ONP Release 4.1 | This feature allows you to export the layout template for an individual site or for all the sites. The layout template export is possible only if the network is analyzed in Cisco ONP Release 4.1. The export of layout template is supported on 4K, 4K-1K-2K, and 2K nodes. |

Use this procedure to export the layout template for a specific site or for all sites.

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Open the network to export the network layout template.

**Step 2** Choose **Network** > **Analyze**.

**Note**
Network must be successfully analyzed to proceed further.

**Step 3** Click the **Layout** tab.

**Step 4** Click the **Hierarchy** tab.

**Step 5** Click the name of a site to download the layout template.

**Step 6** Hover the mouse pointer over the **Export** icon and click **Layout Template** for current site or all Sites.

The **Export Layout Template** dialog box appears.

**Step 7** Click **Export**.

**Note**

- Export the layout template only in the analyze mode. If you export layout templates in upgrade or release upgrade modes, the results may be inaccurate.
- You can export the layout template for nodes of type 4000 and 1000. However, the exported layout template includes only the layout for NCS 2000 nodes. To export the layout template for the node types NCS4K-1K-2K and NCS1K-2K, complete these steps:
  - Right-click the site name under the **Hierarchy** tab, and click **Export**.
  - Click **OK** to export the layout template in text format.

- The layout template for NCS 2000 is provided in XML format.

# Import layout template for NCS 2000 network into Cisco ONP database

Use this procedure to import a template into the Cisco ONP database.

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Choose **Manage** > **Layout Templates**.

**Step 2** Click **Add** in the **Manage Layout Template** dialog box.

**Step 3** Click **Choose Files** and select a template from your local system.

**Step 4** Click **Import**.

The template is imported to the Cisco ONP database.

# Download a layout template for NCS 2000 network

Use this procedure to download a template from the Cisco ONP database:

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Choose **Manage** > **Layout Templates**.

**Step 2** Choose the template that you want to download and click **Download**.

You can also choose multiple templates.

The selected layout template is saved to your local system.

# Delete Layout Template for NCS 2000 Network

Use this procedure to delete a NCS 2000 Network template from the Cisco ONP database:

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Choose **Manage** > **Layout Templates**.

**Step 2** Choose the template that you want to download, and click **Delete** to delete the template from the Cisco ONP database.

You can also choose multiple templates.

# Apply NCS 2000 layout template into a site

Use this procedure to configure the layout of the NCS 2000 section for a site. Although the site can be NCS4K-2K, NCS1K-2K-4K, or NCS1K-2K, you should apply the template only to the NCS 2000 section.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open a network that contains the site where you want to apply the layout template.

**Step 2** Choose **Network** > **Entity Editor**.

**Step 3** In the **Entity Editor** window, expand **Sites** and choose the site.

**Step 4** In the **Layout Template** drop-down list, choose the required template.

**Note**
Ensure that the other properties under the **Layout** section, such as **Chassis Type**, **Power Supply**, **Controller Card**, **Node Protection**, **Redundant Controller Card**, and **MF-Unit** are set to *Auto*. Otherwise, the **Layout Template** drop-down list remains disabled.

The NCS 2000 layout template is applied to the NCS 2000 section of the selected site.

# Import layout templates into NCS1K-2K and NCS4K-1K-2K sites

Use this procedure to add exported layout templates for NCS 1000 and NCS 4000 into 4K-2K and 4K-1K-2K sites.

**Note** If you modify an exported template, rename it before reapplying in upgrade mode to ensure changes are visible in the layout view.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network that has the site to which you want to apply the layout template.
**Step 2** Click the **Layout** tab.
**Step 3** Click the **Hierarchy** tab.
**Step 4** Click **Edit** to enable the edit mode.
**Step 5** Right-click the site where you want to import the layout template, then click **Import**.
**Step 6** Choose the layout template that you want to import into the site and click **OK**.

Cisco ONP applies the chosen layout template to the specified site.

# Network layout visualizations

A network layout visualization is a graphical feature that

- displays the arrangement of racks, chassis, and cards in a network designed using Cisco ONP,
- allows you to interact with and highlight specific hardware components, and
- enables zooming in and out for detailed or broad views.

***Table 14: Feature History***

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Layout Visualization and Edit | Cisco ONP Release 4.1 | This feature allows you to view and adjust the position of NCS 4016 and NCS 1004 chassis and cards in the layout. This feature is supported only on 4K-1K-2K and 1K-2K aggregated nodes and not supported on stand-alone NCS 2000 node. |

When you click a particular rack, chassis, or card in the **Hierarchy** panel, the corresponding hardware component is highlighted in the layout image. This feature enhances the ability to understand and manage complex network physical topologies.

# View network layout

Use this procedure to view the network layout.

**Before you begin**

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Open the network for which you want to view the layout.

**Step 2** Choose **Network** > **Analyze**.

**Note**
The network must be successfully analyzed to proceed further.

**Step 3** Click the **Layout** tab.

**Step 4** In the **Hierarchy** panel, click the site.

**Note**
The OLA sites are highlighted in green, ROADM sites are highlighted in blue, and Aggregated nodes are highlighted in purple.

Passthrough sites are not listed in the layout.

**Step 5** Click any rack under a site to view the rack view of the network under the **Layout** tab.

**Step 6** Click any chassis under a rack to view the chassis view of the network.

**Note**
When you click the Aggregated node under **Hierarchy** panel, NCS 1004, NCS 2000, and NCS 4000 series chassis are placed in separate racks.

You can click the screenshot icon to capture images of all rack layouts of the selected site.

# Edit the layout manually

Use this procedure to position the NCS 4016 and NCS 1004 chassis and cards by manually adjusting the layout.

### Before you begin

Log in to the Cisco ONP web interface.

### Procedure

**Step 1** Open the network where 4K-1K-2K and 1K-2K aggregated nodes are added.

This feature is not supported on NCS 2000 node.

**Step 2** Choose **Network** > **Analyze**.

**Note**
To proceed, make sure the network has been successfully analyzed.

**Step 3** Click the **Layout** tab.

**Step 4** Click **Edit** to enter the Edit mode.

**Step 5** Select a chassis (4K-1K-2K and 1K-2K) or card from a rack.

**Step 6** Drag and drop the selected chassis or card from a particular rack to an empty slot in the same chassis, a different chassis, or a different rack.

**Step 7** Add pluggables to a card.

**Note**
Make sure to add the required cards.

a) Select the Rack.

The cards available in the rack are displayed.

b) Select the card to which you want to add pluggables.

The ports available in the card are displayed.

c) Select the pluggable for each port.

These pluggables are displayed:

| Card | Supported Pluggables |
|---|---|
| NCS4K-4H-OPW-QC2 | • ONS-QSFP8-LR4=<br>• QSFP-110G-SR4-S=<br>• ONS-QSFP-4*10-MLR= |
| NCS4K-4H-OPW-LO | • ONS-QSFP8-LR4=<br>• QSFP-100G-SR4-S=<br>• ONS-QSFP-4*10-MLR= |
| NCS1K4-1.2T-K9= | • ONS-QSFP8-LR4=<br>• QSFP-100G-SR4=<br>• ONS-QSFP28-LR4-S=<br>• QSFP-100G-CWDM4-S=<br>• QSFP-100G-SM-SR= |

d) Click the check mark.

**Step 8** Click **Done**.

Your changes are saved in the layout. You can view any new chassis or card that has been added to the layout in the **BOM** tab.

After you manually edit the layout, you can view the regenerated BOM.

# View layout details using tooltip

Use this procedure when you need to quickly access hardware and port information in the Rack display.

**Procedure**

**Step 1** Hover over a rack, chassis, or card in the Rack display to view summary details in a tooltip.

**Step 2** Click **See More Details** in the tooltip to view information such as port number, type, pluggables, and rates.

Cisco ONP displays the detailed information for the selected rack, chassis, or card.

# Copy configurations from one node to another

Use this procedure to copy the configurations of a specific node to a node at a different site.

You can copy the configuration only during a manual 4K-1K layout movement.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network from which you want to copy the configuration.

**Step 2** Choose **Network** > **Analyze**.

**Note**
Network must be successfully analyzed to proceed further.

**Step 3** Click the **Layout** tab.

**Step 4** Select the rack, chassis, or card of a particular site.

**Step 5** Select the site that will receive the configurations from the **Copy To** drop-down list.

**Step 6** Click **New Rack** to add a new rack. Cisco ONP copies the configuration to the new rack

**Step 7** Click **Done** to save the changes in the layout.

**Note**
You can also cut, copy, and delete racks, chassis, and cards in the layout.

# Export the IPC report

Use this procedure to export the connections of a current site or all sites to an Excel sheet.

**Before you begin**

Log in to the Cisco ONP web interface

### Procedure

**Step 1** Open the network from which you want to export the connections of a current site or all sites to an Excel sheet.

**Step 2** Choose **Network** > **Analyze**.

**Note**
The network must be successfully analyzed to proceed further.

**Step 3** Click the **Layout** > **IPC** tabs.

You can view the patches that are listed in the left pane. Click each patch to view the details such as position, card, and port of the source and destination sites.

**Step 4** Hover over the **Export** icon, and click **Current site** or **All Sites** option.

The **Export IPC** dialog box appears.

**Step 5** Click **Continue** to export the connections of the current site or all sites.

# Export port usage of an LNI network

Use this procedure to export the port usage details of an LNI network.

*Table 15: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| Multi-Layer Connections Phase 1 | Cisco ONP Release 4.1 | This feature provides the connection trace of a service across various interfaces in a network. This feature allows you to export the following:<br>• Consolidated port usage report based on network in addition to the internal port details which you can view by hovering the mouse pointer over the tooltip<br>• Port usage report based on sites<br>• Port usage report only for LNI imported networks |

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the LNI network whose port usage you want to export.

**Step 2** Choose **Network** > **Analyze**.

**Note**
To proceed, make sure the network has been successfully analyzed.

**Step 3** Click the **Layout** tab.

**Step 4** Click the **Hierarchy** tab.

**Step 5** Select the site for which you want to export port usage.

**Step 6** Hover the mouse over the **Export** icon and select **Port Usage** for either **Current site** or **All Sites**.

The **Export Port** dialog box appears.

**Step 7** Click **Continue**.

Cisco ONP exports the port usage details in Excel format.



**Note**

- If you modify any services in the NCS 4000 node after upgrading the LNI network, the changes in the port usage details will not update.
- The demand labels shown for the trunk ports of the NCS4K-DWDM line card in the port mapping report are not logically related to the NCS 4000 trunk ports. They are related to NCS 1004 client ports.

# Define multilayer connections for an SSON network

Use this procedure to define the Multilayer Connections (MLC) such as cards and pluggables for 4K-1K-2K and 1K-2K aggregated nodes in an SSON network.

*Table 16: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| NCS4K-1K-2K Multilayer Connection Trace | Cisco ONP Release 4.2 | You can define Multilayer Connections (MLC) such as cards and pluggables for NCS 4K-1K-2K and NCS 1K-2K aggregated nodes in an SSON network.<br>This new tab in the **Layout** page helps to view end-to-end MLC trace for OTN service starting from **NCS4K IN** until **NCS2K** Add/Drop for LNI network. Also, it helps to define new traces for the newly added service and maintain the network design and deployment. |

**Before you begin**

Log in to the Cisco ONP web interface

**Procedure**

**Step 1** Open the network where you want to define multilayer connections.

**Step 2** Define the MLC:

a) Click the **Layout** tab.

b) Click the **MLC** tab.

Alternatively, you can navigate to the **MLC** page by right-clicking the service name in the network tree and clicking **View in MLC**

You can view the service properties in a table. See MLC details, on page 44.

c) Click the service name to switch to the layout view.

You will view the layout and the service details in the right pane.

d) Select the rack, shelf, card, and ports from the drop-down lists for NCS4K In, NCS4K Out, NCS 1K In, and NCS 1K out, for both **Source** and **Destination** sites.

The NCS 2000 chassis details appear automatically.

**Note**
For an LNI imported network, all details appear automatically. If you add a new service, you can update its details.

e) Click the check icon to save your changes.

Click the refresh icon to remove changes you made after saving.

The updated details are included in the BOM.

**Step 3** To export the MLC details, perform these steps:

a) Click the table icon to switch to the table view.
b) Choose **Export** > **MLC Traces**to export all the details available in the MLC table.
c) Choose **Export** > **LMP/TTI Connections** to export the details of Link Management Protocol (LMP) connections, which are between NCS 1004 and NCS 2000 cards, and Trail Trace Identifier (TTI) connections, which are between NCS 4000 and NCS 1004 cards.

   All these connections are included in the BOM.

**Step 4** To filter the services displayed in the left pane, click the Filter icon and choose one of these options:

- Source Site
- Destination Site
- Type of the traffic
- Trace Origin
  - LNI: imported through Import Live Network option
  - User Created: created through Cisco ONP UI
- Trace Status
  - Completed: User has defined all MLC details,
  - Partial: User has defined only partial MLC details, and
  - Empty: User has not defined any MLC details.

**Step 5** Click the three vertical dots and choose the option you need.

- **Enable Multi Select**: You can select up to the card level for different OTN.
- **Expand All**: Expands the service tree.
- **Collapse All**: Collapses the expanded service tree.
- **Show Trace Status**: Shows the trace status icon next to the service name.

**Step 6** Click the three horizontal dots next to the service trace and choose the option you need.

- **Delete Trace**: Deletes the respective trace.
- **Locate in Map**: Shows the service in the map view.

**Note**
You can enable the same port number on the primary and secondary **NCS4K IN** nodes for Client 1+1 and other protection scheme.

# MLC details

This section describes the various fields available in the MLC tab in the Layout view of a network.

The MLC tab includes these fields.

*Table 17: MLC details*

| Properties | Description |
|---|---|
| Name | Name of the service |
| Group Name | Name of the group to which the service belongs |
| Type | Traffic type |
| Src Site | Source site |
| Src NCS4K In | Details of the rack, slot, card, port in the input side of the NCS 4000 chassis in the source site |
| Src NCS4K Out | Details of the rack, slot, card, port in the output side of the NCS 4000 chassis in the source site |
| Src NCS1K In | Details of the rack, slot, card, port in the output side of the NCS 1004 chassis in the source site |
| Src NCS1K Out | Details of the rack, slot, card, port in the output side of the NCS 1004 chassis in the source site |
| Src NCS2K AddDrop | Add/Drop multiplexer and demultiplexer connected to the NCS 2000 chassis in the source site |
| Src NCS2K MPO | Media channel between the source and destination sites |
| Dst NCS4K In | Details of the rack, slot, card, port in the input side of the NCS 4000 chassis in the destination site |
| Dst NCS4K Out | Details of the rack, slot, card, port in the output side of the NCS 4000 chassis in the destination site |
| Dst NCS1K In | Details of the rack, slot, card, port in the input side of the NCS 1004 chassis in the destination site |
| Dst NCS1K Out | Details of the rack, slot, card, port in the output side of the NCS 1004 chassis in the destination site |
| Dst NCS2K AddDrop | Add/drop multiplexer and demultiplexer that is connected to the NCS 2000 chassis in the destination site |
| Dst NCS2K MPO | MPO cable connecting the NCS 2000 chassis in the destination site |
| Media Channel | Media channel between the source and destination sites |
| Notes | Additional notes, if applicable |

| Properties | Description |
|---|---|
| Trace Origin | Indicates whether the service connections are user-created or imported through LNI. |

# Add new pluggables, alarm cables and 100G client bandwidth licenses to BoM

Use this procedure to add new pluggables, alarm cables, and 100G client bandwidth licenses to an existing BoM for the NCS 1004 and NCS 4000 platforms.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** Open the network you want to update.

**Step 2** Analyze the network by choosing **Network** > **Analyze**.

**Note**
Ensure the network is successfully analyzed before proceeding.

**Step 3** Click the **BOM** tab.

**Step 4** Start adding new items:

a) Click **Add**.

The **New** dialog box opens.

**Step 5** Specify the details:

a) Enter the Cisco part number of the pluggable, alarm cable, or 100G bandwidth license in the **Cisco Part Number** field.

b) Click **Add** to confirm the additions.

The new pluggables, alarm cables, or 100G bandwidth licenses are now listed in the BoM.

# SVO cards

A SVO card is a network hardware component that

- provides licenses based on functionality for features such as alarm correlation, performance monitoring, connection verification, and OTDR,
- serves as the primary card for all networks starting from Release 12.1.0, and
- can be deployed in both ROADM and TRAFFIC nodes as part of network designs.

### Features of the SVO card:

The SVO card offers these key features and configuration options:

- Occupies two slots in the chassis.
- Serves as the primary card for all networks beginning with Release 12.1.0.
- For high availability, a node can be equipped with two SVO cards, but they cannot reside in the same chassis.
- Two 10G SFP+ pluggables can be used to connect two SVO cards within a node.
- A Cisco ASR 920 switch can be connected to SVO cards during network design.
- The SVO solution can operate either as a physical card or as a UCS-based solution.

### SVO licenses

- SVO cards require either a Base License or an SVO Full License which covers High Availability, Connection Verification, and Flex Spectrum. If the SVO Full License is not selected, the SVO Base License and High Availability are enabled by default.
- Types of SVO licenses include:
  - Cisco NMS: Features High Availability, Connection Verification, Flex Spectrum, and OTDR.
  - Third-Party NMS: Includes North Bound Interface (NBI), Alarm Correlation, Performance Monitoring, and Circuit Provisioning.

### Chassis licensing:

- Every chassis added to the network must be licensed from Release 12.1.0 onwards. For networks upgraded to Cisco ONP Release 4.0 or higher, a new chassis license is required after analysis.
- Chassis licenses come in variants such as 1-chassis, 5-chassis, 10-chassis, 20-chassis, 50-chassis, and others, chosen based on cost optimization.
- A license is required for each chassis added to the network after the first chassis.
- Chassis License Flush Out allows you to replace existing chassis licenses with new ones. The current license remains active if the site is unlocked. However, you can use flush out only during network upgrade mode.
- You can continue using existing licenses with changes to the chassis unless you opt for the Chassis License Flush Out option.

# SVO associations

A SVO  association is a network configuration mechanism that

- supports node associations in NCS 2000 networks,
- enables a ROADM node equipped with an SVO card to manage OLA and DGE that may not have their own SVO card, and

- eases the network management with single SVO card.

# Associate OLA or DGE sites with SVO cards

Use this procedure to associate OLAsites with the SVO cards:

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** In the network tree panel, right-click any ROADM or Traffic site with SVO card.

**Step 2** Click **Edit** SVO **Associations**.

**Step 3** Select the OLA sites on the map to toggle the SVO connections. To confirm your selection, click **Done** at the top-right corner.

You can open widgets in the map and select the top section to view the association.

**Note**
You can also right-click any ROADM or Traffic site from the map and click **Edit SVO Associations**. For the DGE sites, the **Edit** SVO **Associations** option is not displayed.

During network analysis, the tool automatically associates the sites you do not associate with the SVO card.

# Upload NETCONF XML files on SVO web interface

Use this procedure to upload NETCONF XML files on the SVO web interface to configure and provision network nodes using exported configuration data.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** In the browser URL field, enter the IP address of the SVO line card.

The login page appears.

**Step 2** Enter the username and password.

**Step 3** Click **Login**.

**Step 4** Click the hamburger icon and select **Node Configuration**.

**Step 5** Click the **Node Setup** tab.

**Step 6** Click **Select files** .

**Step 7** Browse to the NETCONF XML files exported from the Cisco ONP GUI and upload them.

If the passive unit ID in the NETCONF file exceeds the range 1 to 126, SVO displays an error message. Validate the XML file and import it again.

**Note**
If the FEC mode provisioned in the 200G-CK-C line card does not match with the value in the NETCONF XML file, SVO displays an error message. Remove the provisioned FEC settings for this card and reimport the XML file.

# Export NETCONF XML Files for individual sites

Use this procedure to export NETCONF XML files for individual sites from the Cisco ONP GUI.

**Before you begin**

Log in to the Cisco ONP web interface.

**Procedure**

**Step 1** In the network tree panel, enable the **Stage** button.

**Step 2** Select the check box for the individual site.

You can select only one site at a time and download the NETCONF XML file for that site by enabling the **Stage** button.

**Step 3** Right-click the site.

**Step 4** Click **Generate NetConf XML**.

The message "Success. Netconf exported successfully" appears.